The opinion in support of the decision being entered today
is *not* binding precedent of the Board

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte FRANK RICHTER,
JOSEF PEDAIN, KLAUS KACHTKAMP
and ANDREAS FLINK

Appeal No. 2007-3827
Application 08/713,905
Technology Center 1700

Decided: September 10, 2007

Before CHUNG K. PAK, CHARLES F. WARREN, and
TERRY J. OWENS, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal to the Board from the decision of the Primary Examiner finally rejecting claims 1, 3, and 4 in the Office Action mailed December 19, 2002, and refusing to allow claim 2 as subsequently amended in the Amendment filed February 19, 2003, which was entered in the

Advisory Action mailed May 13, 2003. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 1.191(a) (2003).

We affirm the decision of the Primary Examiner.

Claims 1 and 3 illustrate Appellants' invention of a process for the production of an ether (poly)isocyanate and ether (poly)isocyanate products, and are representative of the claims on appeal:

1. A process for the production of an ether (poly)isocyanate having a hydrolyzable chlorine content less than or equal to 48 ppm from an ether (poly)amine comprising reacting

a) an ether (poly)amine

with at least a stoichiometric amount (based on the number of primary amine groups present in a)) of

b) phosgene or a compound which generates phosgene under the reaction conditions

in the vapor phase at a temperature of from about 50 to about 800°C under pressure.

3. An ether isocyanate selected from the group consisting of 2-(2-isocyanato-propoxy)-1-propyl isocyanate, 1,1'-oxydi-2-propyl isocyanate, 2,2'-oxydi-1-propyl isocyanate and mixtures thereof having a hydrolyzable chlorine content of no more than 43 ppm.

The Examiner relies on the evidence in these references:

Lehmann	US 3,267,122	Aug. 16, 1966
Joulak	US 5,391,683	Feb. 21, 1995
Biskup	US 5,449,818	Sep. 12, 1995
Bischof	US 5,516,935	May 14, 1996

Appellants request review of the following grounds of rejection all advanced on appeal (Br. 3):

Claims 1 through 4 under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at

the time the application was filed, had possession of the claimed invention, thus, failing to comply with the written description requirement (Answer 3-4); and

Claims 1 and 2 under 35 U.S.C. § 103(a) as being unpatentable over Lehmann in view of Joulak or Biskup or Bischof (*id.* 4-5).

Appellants state the claims in each group stand or fall together (Br. 3), and thus, we decide this appeal based on claim 1 with respect to both grounds of rejection. 37 C.F.R. § 1.192(c)(7) (2003); *see also* 37 C.F.R. § 41.37(c)(1)(vii) (September 2004).

This panel entered a decision in Appeal No. 1999-1008 on August 30, 2001 in this Application. In subsequent prosecution, Appellants amended claims 1 through 4 and submitted the Declaration of Dr. Stutz under 37 C.F.R. § 1.132 (2002) (Stutz Declaration) with the Amendment filed September 30, 2002. Accordingly, we consider the record anew. *See In re Rinehart*, 531 F.2d 1048, 1051-52, 189 USPQ 143, 147 (CCPA 1976).

Considering first the ground of rejection under § 112, first paragraph, written description requirement, the Examiner contends "Appellants have failed to provide adequate support for the ranges of values claimed for the hydrolyzable chlorine content" stated in claim 1 (Answer 3). The Examiner finds the Examples support a hydrolyzable chlorine content of 24 ppm, 34 ppm, 43 ppm, 44 ppm, and 48 ppm, which does not provide support for values below 24 ppm. The Examiner contends the disclosure at page 5, lines 19-21, of the Specification, indicating "the ether isocyanate may be isolated in pure form by known processes is deficient, because the argued passage lacks any specifics with a respect to controlling the hydrolyzable

chlorine content or what levels of hydrolyzable content differentiate a pure compound from an impure compound" (*id.* 4).

Appellants contend the Specification conveys to one of ordinary skill in the art that the claimed invention "is capable of producing an ether isocyanate having a hydrolyzable chlorine content of less than 48 ppm," pointing to the Examples and the disclosure at page 5, lines 19-21, of the Specification (Br. 4; see also Reply Br. 2). With respect to the latter, Appellants point to the disclosure "[t]he ether isocyanate may then be isolated in pure form by known processes," and argue the term "chemically pure" as defined in *Hawley's Condensed Chemical Dictionary* is stated to "exist when no impurity can be detected by experimental procedures,"[1] (Br. 4-5, emphasis supplied in the Brief omitted). Appellants contend "[h]ydrolyzable chlorine is an impurity which can obviously be detected by an experimental procedure" (Br. 5).

The issue in this ground of rejection is whether the Examiner has established that, prima facie, as a matter of fact claim 1 does not satisfy the requirements of § 112, first paragraph, written description requirement.

The plain language of appealed process claim 1 encompasses processes of producing any ether (poly)isocyanate from any ether (poly)amine comprising at least the steps of reacting any ether mono- or poly-amine with at least a stoichiometric amount of phosgene or a compound which generates the same under the reaction conditions, wherein the only reaction conditions specified are "conducting the reaction in vapor

phase at a temperature of about 50 to about 800°C under pressure," and the product is any ether mono- or poly-isocyanate produced by the specified process has a hydrolyzable chlorine content of 48 ppm or less. *See, e.g., In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364, 70 USPQ2d 1827, 1830 (Fed. Cir. 2004); *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); *In re Zletz*, 893 F. 2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). The generic term "an ether (poly)amine" includes both mono- and polyamines, such as the ether mono-, di- or tri-amine falling within the chemical formula set forth in claim 2 wherein "n represents 1, 2 or 3," and result in the corresponding "an ether (poly)isocyanate" (*see also* Specification 4:2-22, 5:22-24, and 6:13-7:6). The transitional term "comprising" opens the claim to include any manner of addition reagents, steps and reactions conditions. *See, e.g., In re Baxter*, 656 F.2d 679, 686-87, 210 USPQ 795, 802-03 (CCPA 1981) ("As long as one of the monomers in the reaction is propylene, any other monomer may be present, because the term 'comprises' permits the *inclusion* of other steps, elements, or materials.").

We find the written description in the Specification describes to one of ordinary skill in this art a broad process, which is set forth in the same manner in original claim 1, and that the broad process "may be carried out using known techniques" without limitation (Specification 4:2-9 and 23-24; and 12). Appellants disclose that "[a]fter the reaction with phosgene, the

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[1] *See* **purity, chemical,** *Hawley's Condensed Chemical Dictionary* 980 (11th ed., Richard J. Lewis, Sr., revisor, New York, Van Nostrand Reinhold Company, 1987).

ether isocyanates are recovered by cooling the gas stream to a temperature above the decomposition temperature of the corresponding intermediate carbamic acid chlorides," from which "[t]he ether isocyanate may then be isolated in pure form by known processes such as distillation, crystallization, extraction or film distillation, or recovered as raw product (solution)" (Specification 5:16-21). The ether (poly)isocyanate products produced in processes exemplified in Examples 1-4 are diisocyanates, and are all prepared by the process steps stated in Example 1. The products prepared in these examples are all defined by "% of the theoretical yield," percent "purity (GC)," percent "NCO content" compared to percent "theoretical," and "[h]ydrolyzable chlorine content" in "ppm." Specification, e.g., 8:22-29, and 9:7-9, 14-16, and 22-24. The "purity" and "hydrolyzable chlorine content" of the products of Examples 1-4 are: 99.7% and 43 ppm; 99.8% and 48 ppm; 99.5% and 34 ppm; and 99.8% and 24 ppm, respectively (*id.*). The process exemplified in Example 5 produces an ether monoisocyanate species by the process steps stated in Example 1 with "purity" and "[h]ydrolyzable chlorine content" of 99.1% and 44 pm, respectively (Specification 9:25-10:3).

We find no disclosure of a range of hydrolyzable chlorine content in ppm or otherwise in so many words in the disclosure of the Specification and original claims, or any disclosure therein correlating any process limitation with the hydrolyzable chlorine content now specified in appealed claim 1.

We find that the record supports the Examiner's position that, prima facie, as a matter of fact the written description in the Specification as a

whole as filed does not describe to one skilled in this art the range of hydrolyzable chlorine content in ppm of the product ether (poly)isocyanates prepared by the process specified in appealed claim 1. Indeed, the Examiner has presented evidence and reasons why this persons would not recognize in the disclosure a written description of the invention defined by claim 1 sufficient to establish a prima facie case, shifting the burden to Appellants to establish otherwise. Accordingly, we again evaluate all of the evidence in the written description in the Specification as a whole, giving due consideration to the weight of Appellants' arguments in the Brief and Reply Brief. *See, e.g., In re Alton*, 76 F.3d 1168, 1172, 1175-76, 37 USPQ2d 1578, 1581, 1583-84 (Fed. Cir. 1996); *In re Wertheim*, 541 F.2d 257, 262-65, 191 USPQ 90, 96-98 (CCPA 1976).

The entire written description in the Specification must be considered in determining whether the disclosure does in fact "convey with reasonable clarity to those skilled in the art that, as of the filing date sought, [Appellants were] in possession *of the invention . . . now claimed*." *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991); *see also, e.g., In re Wilder*, 736 F.2d 1516, 1520-521, 222 USPQ 369, 372-73 (Fed. Cir. 1984). The determination of whether Appellants were in possession of the later claimed invention, product or process, is based on the analysis of the facts of record in each case, and is not determined by any holding with respect to a certain number of species or other such considerations in other product and process cases. *See, e.g., Vas-Cath,* 935 F.2d at 1561-562, 19 USPQ2d at 1116; *Wertheim*, 541 F.2d

at 262-65, 191 USPQ at 96-98, and cases cited therein.[2] Appellants can amend the originally claimed invention to avoid prior art or for other purposes where there is adequate written description in the Specification establishing that they were in possession of the invention to which they retreat at the time the Application was filed. *See, e.g., Wertheim*, 541 F.2d at 263-64, 191 USPQ at 97.

We agree with the Examiner's position that the passage at page 5, lines 19-21, when taken in context of the remainder of the paragraph (*see above* p. 6) and the disclosure in the Specification as a whole, would not indicate to one skilled in the art that the hydrolyzable chlorine content of the product of the process is controlled by the vapor phase temperature and temperature conditions specified in the claim. Indeed, the cited passage as a whole discloses that post reaction processing involving recovery of any manner of ether (poly)isocyanate product and the subsequent use of any manner of isolation methods result in a product "in pure form," none of which workup steps are required by the claimed process or disclosed in the Specification with respect to the manner in which a hydrolyzable chlorine content falling within the claimed range is arrived at. *Cf. In re Sussman*,

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[2] Broadly articulated rules are particularly inappropriate in this area. Mere comparison of ranges is not enough, nor are mechanical rules a substitute for analysis of each case on its facts to determine whether an application conveys to those skilled in the art the information that the applicant invented the subject matter of the claims. In other words, we must decide whether the invention appellants seek to protect by their claims is part of the invention that appellants have described *as theirs* in the specification. [Citations omitted.]

Wertheim, 541 F.2d at 263-64, 191 USPQ at 97.

141 F.2d 267, 269-70, 60 USPQ 538, 541 (CCPA 1944) ("If appellant obtains a new product through reaction of the elements mentioned, it must be due to some step in the process not included in the claim."). In this respect, the result in cases such as *In re Eickmeyer*, 602 F.2d 974, 202 USPQ 655 (CCPA 1979), cited by Appellants (Br. 4), involving ranges of specified reaction conditions, provide little, if any, guidance. *See, e.g., Wertheim*, 541 F.2d at 262-65, 191 USPQ at 96-98.

We cannot agree with Appellants' position that the phrase "in pure form" in this passage is tantamount to "chemical purity" per se and thus, synonymous with "hydrolyzable chlorine content" when considered in the context of the disclosure in the Specification as a whole. Indeed, there is no disclosure of "hydrolyzable chlorine content" with respect to the claimed process other than in the illustrative examples, and there is no disclosure in these examples correlating "percent purity (CG)" with "hydrolyzable chlorine content" in "ppm." We note that a "purity" of "99.8%" is listed for two different ether diisocyanates which exhibit a hydrolyzable chlorine content of 48 ppm and 24 ppm, respectively, even though the products are prepared by the same process. Thus, on this record, while hydrolyzable chlorine content may be attributed to an impurity, it is apparently not the only impurity present in the product.

Therefore, in the absence of disclosure in the Specification which describes "hydrolyzable chlorine content" within the claimed range across the breath of the ether (poly)isocyanate products obtained from any ether (poly)amine reactant using at least any specified vapor phase reaction condition within the specified temperature range, one skilled in this art

would not consider Appellants to have been in possession of the claimed method encompassed by appealed claim 1 at the time the application was filed.

Accordingly, upon reconsideration of the facts in the evidence of record as a whole, we determine that, as a matter of fact, one skilled in this art would not have reasonably recognized in the disclosure in Appellants' Application as filed, a description of the invention encompassed by appealed claims 1 through 4 which establishes that Appellants were in possession of the claimed inventions encompassed by these appealed claims, including all of the limitations thereof, at that time as required by § 112, first paragraph, written description requirement.

Turning now to the ground of rejection under § 103(a), the Examiner finds that while Lehmann produces ether (poly)isocyanates from ether (poly)amines and phosgene but not in the vapor phase, Joulak, Biskup, and Bischof teach vapor phase phosgenation of diamines "with an attendant increase in yield, as compared to conventional phosgenation processes (Answer 4). The Examiner concludes one of ordinary skill in the art would have been motivated to use vapor phase phosgenation of Joulak, Biskup, and Bischof with the ether amines of Lehmann to improve yield (*id.* 4-5). The Examiner finds the Stutz Declaration insufficient to remove the art rejection (*id.* 5). According to the Examiner:

> Declarer [Stutz] has stated he would not have expected to be able to produce an ether (poly)isocyanate under the conditions required for gas phase phosgenation of the corresponding (poly)amine in view of the cleavage problem associated with ether isocyanates. To support his position, declarer cites passages from Annalen der Chemie; however, the cited

> passages do not appear to closely relate to aspects of vapor phase phosgenation; therefore, the passages and the relied upon vapor phase phosgenation processes of [Joulak, Biskup, and Bischof] lack the necessary nexus to establish a clear correlation between the claimed subject matter and the subject matter of the declaration. In the absence of such a correlation, the position is taken that the evidence of obviousness outweighs the evidence of nonobviousness.

Id. 5.

Appellants contend Joulak and Bischof do not teach that gas phosgenation can be used to produce ether isocyanate (Br. 5; Reply Br. 3). Appellants contend Biskup teaches preparing ether aromatic isocyanates from ether group containing aromatic amines using the disclosed gas phosgenation process "but does not teach that the isocyanate produced by that process would retain such ether group" and one skilled in the art would not expect the ether group to be retained under the condition of gas phase phosgenation as pointed out in the Stutz Declaration (Br. 5). Appellants contend the Examiner has improperly disregarded the Stutz Declaration, pointing out

> Appellants have not argued that the teachings of [Biskup] with respect to the presence of ether groups in the amine starting materials should be dismissed. However, it can not be properly assumed that the ether groups present in the starting material will be present in the product of a gas phase phosgenation.

Id. 6 (original emphasis omitted).

In this respect, Appellants contend their position is supported by the cited sections of *Annalen der Chemie* in the Declaration "which teach that even though an ether group is present in the amine starting material, the phosgenation product does not contain the corresponding isocyanate in

significant, recoverable amounts" (Br. 6; original emphasis omitted). In other words, Appellants contend the cited sections "are directed to the known problem encountered with phosgenation of ether amines, i.e., replacement of the oxygen with chlorine to such an extent that high yields of ether polyisocyanate could not be obtained," in view of which "one skilled in the art, such as Dr. Stutz, would have expected to encounter this problem in phosgenation of ether amines, particularly in a gas phase phosgenation process" as stated in the declaration

(Reply Br. 3). Appellants point out Lehmann teaches "it is known that diamines containing ether groups 'upon phosgenation yield mainly ether cleavage products'" (*id.*, citing Lehmann, col. 1, ll. 16-18). Appellants thus maintains Biskup "teaches gas phase phosgenation of aromatic amines which 'may' contain ether groups but does not teach or suggest that those ether groups 'survive' phosgenation to such a degree that a high yield of ether (poly)isocyanates having a hydrolyzable chlorine content of 48 ppm or less is obtained" (*id.*, original emphasis omitted).

The issues in this appeal are whether the Examiner has established a prima facie case of obviousness over the applied references and whether Appellants' arguments based on the evidence in the Stutz Declaration are sufficient to rebut the prima facie case.

We find that Lehman acknowledges "[f]or example, *diamines obtained by the addition of acrylonitrile to bifunctional alcohols with subsequent hydrogenation upon phosgenation yield mostly cleavage products with an accompanying minute amount of diisocyanate formed; see in this regard Annalen der Chemie, vol. 562, page 87 (1949)*" (*id.* col. 1,

ll. 15-28; emphasis supplied). Lehman would have disclosed to one of ordinary skill in this art that, contrary to the teachings of the prior art which would expect ether cleavage products to be formed during the phosgenation of ether (poly)amines to the corresponding isocyanate in low yield, the phosgenation of the specifically disclosed ether diamines by known methods will form desirable yields of the corresponding diisocyanates with little if any cleavage (Lehman, e.g., col. 1, lines 15-71, and col. 2, 1-33). The specifically disclosed ether diamines falling within the structural formula taught by Lehmann include ether containing aliphatic, cycloaliphatic and aromatic diamines (*id.* col. 1, ll. 37-63, and col. 2, ll. 1-12).

Lehmann teaches a number of phosgenation processes, specifying only that the phosgenation process is conducted "at a temperature up to about 200°C", and exemplifies carrying out the process in an inert solvent (Lehmann, e.g., col. 2, ll. 16-33, Examples 1-5 and claims 3 and 4). Lehmann teaches the phosgenation can be carried out in a continuous manner, with best results obtained with inert solvents including toluene, xylene, chlorobenzene, and o-dichlorobenzene (*id.* col. 2, ll. 20-24). While Lehmann does not specifically so state, we find one of ordinary skill in this art would have recognized from the reference that the processes of the reference are conducted under at least atmospheric pressure, not in a vacuum.[3] Lehmann further discloses "[t]he isocyanates prepared according

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[3] It is well settled that a reference stands for all of the specific teachings thereof as well as the inferences one of ordinary skill in this art would have reasonably been expected to draw therefrom, *see In re Fritch*, 972 F.2d 1260, 1264-65, 23 USPQ2d 1780, 1782-83 (Fed. Cir. 1992); *In re Preda*,

to the invention are obtained in such a pure form that a separate purification step such as by recrystallization or distillation is not required," and that "[a] brief heating of the reaction product in vacuo below the boiling point of the solvent used or by blowing a neutral gas through it at high temperature is sufficient for destroying or otherwise disposing of any carbamic acid chlorides still present" (id. col. 2, ll. 34-41).

We find Biskup acknowledges that "*[a]lthough the preparation of organic isocyanates from the corresponding amines by reaction with phosgene in the gas phase has long been known (e.g., Siefken, Ann. 562, 108 (1949)), the process has, until now, only been of technical importance for monoamines . . . and (cyclo)aliphatic diamines*" (Biskup col. 1, ll. 10-16; emphasis supplied). Thus, Biskup would have disclosed to one of ordinary skill in the art that the phosgenation of aromatic diamines, including ether containing aromatic diamines, to the corresponding aromatic diisocyanates, including ether containing aromatic diisocyanates, in high yield can be conducted with an excess of phosgene in the vapor phase in continuous manner with an inert, diluent solvent carrier gas at a temperature above the boiling point of the diamine with selective recovery and distillation of the diisocyanate at the same temperature, wherein the temperature is generally from 200° to 600°C and the process conducted under pressure (*id.*, e.g., Abstract, col. 1, l. 45, to col., 2, l. 20, col. 2, l. 63, to col. 3, l. 6, col. 3, l. 50, to col. 5, l. 4, col. 5, ll. 29-31, and Examples 1-3

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401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968), presuming skill on the part of this person. *In re Sovish*, 769 F.2d 738, 743, 226 USPQ 771, 774 (Fed. Cir. 1985).

and 5). The selective recovery is conducted in inert solvent at a temperature above the decomposition temperature of the carbamic acid chloride corresponding to the diisocyanate (*id.*, e.g., col. 4, l. 50, to col. 5, l. 4). The solvents used for phosgenation and product recovery include chlorobenzene, o-dichlorobenzene, and xylene (*id.*, e.g., col. 3, ll. 1-6, and col. 4, l. 66, to col. 5, l. 4).

We find Bischof acknowledges that "*[p]reparation of organic isocyanates by reacting amines with phosgene in the gas phase is known. (See, for example, Siefken, Justus Liebigs Ann. Chem. 562, 108 (1949))," and that "such processes have, until now, been recommended only for the preparation of monoisocyanates . . . [,] commercially available (cyclo)aliphatic diisocyanates . . . or large-scale production of aromatic diisocyanates*" (Bischof col. 1, ll. 10-18; emphasis supplied). Thus, Bischof would have disclosed to one of ordinary skill in the art the phosgenation of aliphatic and cycloaliphatic diamines to the corresponding diisocyanates can be conducted with an excess of phosgene in the vapor phase in continuous manner with an inert, diluent carrier gas at a temperature of from 200° to 600° C and under pressure, with selective recovery of the diisocyanate followed by distillation to obtain the "pure" diisocyanate product in higher yields than by conventional phosgenation processes (*id.*, e.g., col. 1, ll. 48-56, col. 2, l. 1, to col. 3, l. 38, col. 4, ll. 12-50, and Examples 1-4). The selective recovery is conducted in inert solvent at a temperature above the decomposition temperature of the corresponding to the diisocyanate (*id.*, e.g., col. 4, ll. 12-35). The solvents used for phosgenation and product

recovery include chlorobenzene, o-dichlorobenzene, and xylene (*id.*, e.g., col. 3, ll. 25-28, and col. 4, ll. 24-30).

We find Joulak acknowledges that the preparation of mono- and polyisocyanates by phosgenation of amines "*in the gaseous phase has long been known to this art, albeit such reaction has essentially been limited to the conversion of monofunctional amines*" (Joulak, col. 1, ll. 13-17; emphasis supplied). Thus, Joulak would have disclosed to one of ordinary skill in the art the phosgenation of aromatic polyamines to the corresponding aromatic polyisocyanates can be conducted with an excess of phosgene in the vapor phase in continuous manner with an inert, diluent carrier gas at a temperature "advantageously ranges from 250° to 500° C" and under pressure, with selective recovery of the diisocyanate followed by purification (*id.*, col. 1, l. 37, to col. 2, l. 52, col. 3, l. 55, to col. 4, l. 28, and Examples 1 and 2). "The process . . . may be carried out under pressure, at reduced pressure, or at atmospheric pressure, with no adverse consequences" (*id.* col. 4, ll., 6-10). The selective recovery is conducted in inert solvent at a temperature above the decomposition temperature of the carbamyl chloride corresponding to the diisocyanate, and purification is "notably by distillation" (*id.*, e.g., col. 4, ll. 12-35). The solvents used for phosgenation and product recovery include xylene, o-dichlorobenzene, and chlorobenzene (*id.*, e.g., col. 3, ll. 25-28, and col. 4, ll. 24-30).

We find Dr. Stutz testifies in his Declaration that, among other things,

> I, as one skilled in the art of gas phase phosgenation, would not consider the teachings of [Lehmann] to be applicable to the gas phase phosgenation of ether (poly)amines because it was well known at the time the present invention was made that

> phosgenation of ether (poly)amines resulted in the formation of a large quantity of unwanted product(s) due to cleavage.

Stutz Declaration ¶ 2. Dr. Stutz quotes certain passages on pages 83 and 87, and cites to a passage on page 104 of "Annalen der Chemie, Band 562."[4] The full paragraph on page 83, quoted in part by Dr. Stutz, reads as follows:

> The simplest representative of this solid class,] methoxy propylamine with the reaction of phosgene in toluene as a thinning agent produces a mixture of methoxypropyl isocyanate and chloropropyl isocyanate **which cannot be separated by fractional distillation**. Under the test conditions, the methoxy residue was replaced with chlorine.

Siefken 83; translation 83; Stutz Declaration ¶ 2 (emphasis as supplied in Declaration). Dr. Stutz further testifies with respect to the method of producing γ-chlorine propyl isocyanate set forth on page 104, "it is reported that pure chlorine propyl isocyanate . . . was obtained in high yield under the described experimental conditions" (Stutz Declaration ¶ 2). The full paragraph on page 87 quoted by Dr. Stutz reads as follows:

> Ether diamines, which can be obtained from adding acrylic nitrile to bi-functional alcohols and subsequent hydration, such

[4] We fail to find a copy of *Justus Liebigs Annalen der Chemie*, vol. 562 attached to the Declaration as stated (Stutz Declaration ¶ 2). We do find Appellants submitted pages 83-105 of Siefken, "Mono- und Polyisocyanate," *Justus Liebigs Annalen der Chemie* 562. Band" (hereinafter Siefken) in the Information Disclosure Statement filed December 16, 1996, wherein this document is cited as "Annalen der Chemie (1948 . . .) 83-105" on the accompanying Form PTO-1449. We further find an English translation of these pages attached to this document, which does not identify the translator. We further note that this document apparently has a publication date of 1949 as evinced by Biskup (col. 1, ll. 12-13) and Bischof (col. 1, ll. 11-12). We have considered the English translation of Siefken supplied by Appellants and refer to that translation herein.

> as the ethylene glycol diamine dipropyl ether $NH_2 \cdot (CH_2)_3 \cdot O \cdot CH_2CH_3 \cdot O \cdot (CH_2)_3 \cdot NH_2$ produces mainly decomposition products while the expected diisocyanates only occur with poor yield.

Siefken 87; translation 87; Stutz Declaration ¶ 2.

Dr. Stutz further testifies "I would not have expected to be able [sic] produce an ether (poly)isocyanate under the conditions required for gas phase phosgenation of the corresponding (poly)amine in view of this recognized cleavage problem and the teachings in the art at the time the present invention was made" (Stutz Declaration ¶ 3). Dr, Stutz further testifies that the disclosure of ether containing aromatic diamines in Biskup "would not, alone, lead me to expect that gas phase phosgenation of ether (poly)amines would produce the desired ether (poly)isocyanate in satisfactory yield" (Stutz Declaration ¶ 5). Dr. Stutz further testifies no teachings in Bischof and Joulak "would lead me to believe that ether (poly)amines could be effectively phosgenated in the gas phase by the disclosed methods" (Stutz Declaration ¶ 4).

Dr. Stutz further testifies "I would not have combined the teachings of" Lehmann, Joulak, Biskup, and Bischof "in the manner suggested" by the Examiner "at the time the present invention was made" and "I would not have expected to be able to produce ether (poly)isocyanates with low hydrolyzable chlorine contents in good yield by a gas phase phosgenation process at the time the claimed invention was made" (Stutz Declaration ¶ 6).

We find that the monoether monoamine compound "methoxy propylamine," $H_2N(CH_2)_3OCH_3$, and the diether diamine compound "$NH_2 \cdot (CH_2)_3 \cdot O \cdot CH_2CH_3 \cdot O \cdot (CH_2)_3 \cdot NH_2$" in the quoted passages in the Stutz

Declaration do not fall within the diether diamine compounds encompassed by Lehmann's structural formula "$H_2N(CH_2)_3OCH_2$-$C(R_1)(R_2)$-$CH_2O(CH_2)_3NH_2$" (Lehman col. 1, ll. 42-54). We further find that Dr. Stutz testimony does not include the "test conditions" referred to in the passage quoted from page 83 of Siefken.

We determine the combined teachings of Lehmann, Joulak, Biskup, and Bischof, the scope of which we determined above, provide convincing evidence supporting the Examiner's case that the claimed invention encompassed by claim 1, as we interpreted this claim above, would have been prima facie obviousness of to one of ordinary skill in the organic chemistry arts familiar with the synthesis of isocyanates by phosgenation of the corresponding amines.

The thrust of the ground of rejection is that prima facie, one of ordinary skill in this art would have been motivated to prepare ether diisocyanates from the ether diamines encompassed by Lehmann's structural formula by the continuous process of vapor phase phosgenation following the methods of any of Joulak, Biskup, and Bischof in the reasonable expectation that Lehmann's ether diamines will be converted into the corresponding ether diisocyanates in good yield. We are of the opinion that this person would have had a reasonable expectation of success because the ether diamines encompassed by Lehmann's structural formula are taught to undergo little, if any, cleavage contrary to the knowledge in the prior art; Joulak, Biskup, and Bischof each explain that their processes overcome problems with conversion in the vapor phase experienced in such phosgenation methods known in the prior art; and the phosgenation methods

used by Lehmann, which can be continuous, can be conducted at the same and similar temperature and pressure conditions using the same or similar solvents as the continuous vapor phase phosgenation methods of each of Joulak, Biskup, and Bischof. This person would have further recognized that Lehmann teaches that the ether diisocyanates are obtained in "pure" form and, like each of Joulak, Biskup, and Bischof, controls the amount of carbamic acid chloride in the product.

Accordingly, in our view, one of ordinary skill in this art routinely following the combined teachings of Lehmann, Joulak, Biskup, and Bischof would have reasonably arrived at the claimed processes encompassed by appealed claim 1, including all of the limitations thereof arranged as required therein, without recourse to Appellants' Specification. *See, e.g., In re Kahn*, 441 F.3d 977, 985-88, 78 USPQ2d 1329, 1334-37 (Fed. Cir. 2006); *In re Dow Chem. Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988);[5] *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981);[6] *see also In re O'Farrell*, 853 F.2d 894, 903-04, 7 USPQ2d

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5 The consistent criterion for determination of obviousness is whether the prior art would have suggested to one of ordinary skill in the art that [the claimed process] should be carried out and would have a reasonable likelihood of success, viewed in light of the prior art. [Citations omitted] Both the suggestion and the expectation of success must be founded in the prior art, not in the applicant's disclosure.

Dow Chem., 837 F.2d at 473, 5 USPQ2d at 1531.

6 The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of

1673, 1680-81 (Fed. Cir. 1988) ("Obviousness does not require absolute predictability of success. . . . For obviousness under § 103, all that is required is a reasonable expectation of success." (citations omitted).

We recognize that the applied references do not specifically address the matter of hydrolyzable chlorine but do teach control of carbamic acid chloride. However, one of ordinary skill in this art would have reasonably expected that the claimed processes produce identical or substantially identical products to that of the combined teachings of the applied references even though the references are silent with respect to ppm of hydrolyzable chlorine, thus shifting the burden to Appellants to patentably distinguish the claimed process encompassed by appealed claim 1 over the applied prior art even though the ground of rejection is under § 103(a). Indeed, this is the case here as appealed claim 1 does not correlate any process step with the range of hydrolyzable chlorine in ppm, and the references teach recovery and further workup of the isocyanate product, including control of carbamic acid chloride. *See, e.g., In re Best*, 562 F.2d 1252, 1255-56, 195 USPQ 430, 433-34 (CCPA 1977);[7] *In re Skoner*,

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> the references would have suggested to those of ordinary skill in the art.

Keller, 642 F.2d at 425, 208 USPQ at 881.

[7] Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. See *In re Ludtke*, [441 F.2d 660, 169 USPQ 563 (CCPA 1971)]. Whether the rejection is based on "inherency" under 35 USC 102, on "prima facie obviousness" under 35 USC 103,

517 F.2d 947, 950-51, 186 USPQ 80, 82-83 (CCPA 1975) ("Appellants have chosen to describe their invention in terms of certain physical characteristics of the roughened substrate surface. . . . Merely choosing to describe their invention in this manner does not render patentable their method which is clearly obvious in view of [the reference]." (Citation omitted)); *cf. In re Spada*, 911 F.2d 705, 708-09, 15 USPQ2d 1655, 1657-58 (Fed. Cir. 1990);[8] *In re Woodruff*, 919 F.2d 1575, 1577-78, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990).[9]

We cannot agree with Appellants' position that Dr. Stutz's testimony is sufficient to establish that one of ordinary skill in this art would not have

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> jointly or alternatively, the burden of proof is the same, and its fairness is evidenced by the PTO's inability to manufacture products or to obtain and compare prior art products. [Footnote and citation omitted.]

Best, 562 F.2d at 1255, 195 USPQ at 433-34.

[8] The Board held that the compositions claimed by Spada "appear to be identical" to those described by Smith. While Spada criticizes the usage of the word "appear," we think that it was reasonable for the PTO to infer that the polymerization by both Smith and Spada of identical monomers, employing the same or similar polymerization techniques, would produce polymers having the identical composition.

Spada, 911 F.2d at 708, 15 USPQ2d at 1657-58.

[9] The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. [Citations omitted.] These cases have consistently held that in such a situation, the applicant must show that the particular range is *critical*, generally by showing that the claimed range achieves unexpected results relative to the prior art range. [Citations omitted.]

Woodruff, 919 F.2d at 1577-78, 16 USPQ2d at 1936-37.

had a reasonably expectation of success in converting Lehmann's ether diamines to ether diisocyanates via the vapor phase phosgenation methods taught by Joulak, Biskup, and Bischof. As the Examiner points out, the passages from Siefken relied on by Dr. Stutz do not relate to the vapor phase phosgenation methods taught in the references, and indeed, the ether amine starting materials in the passages are not those specifically taught by Lehmann. Furthermore, Lehmann specifically addresses the passage from page 87 of Siefken quoted by Dr. Stutz, pointing out the performance of the ether amines specifically taught therein contradicts the results reported by Siefken. Indeed, Biskup, and Bischof disclose that their phosgenation processes overcome problems reported by Siefken, and Joulak disclose that the phosgenation processes disclosed therein overcome problems recognized in the art.

Accordingly, Dr. Stutz's testimony does not address the specific teachings of the applied references and thus, the thrust of the rejection, and accordingly, we accord this testimony little, if any, weight. *See In re Reuter*, 670 F.2d 1015, 1023, 759, 210 USPQ 249, 256 (CCPA 1981) (a factual statement by an expert in the art is entitled to full consideration in the absence of evidence to the contrary); *In re Lindner*, 457 F.2d 506, 508, 173 USPQ 356, 358 (CCPA 1972) ("[M]ere conclusory statements in the specification and affidavits are entitled to little weight when the Patent Office questions the efficacy of those statements." (citations omitted)); *see also, e.g.*, *In re Grunwell*, 609 F.2d 486, 491, 203 USPQ 1055, 1059 (CCPA 1979).

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in the combined teachings of Lehmann, Joulak, Biskup, and Bischof with Appellants' countervailing evidence of and argument for nonobviousness and conclude that the claimed invention encompassed by appealed claims 1 and 2 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

The Primary Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED

sld/ls

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